



AT ISSUE: ▼

There is a common misconception that a distribution transformer with copper windings is in some way more efficient, more reliable, or has higher short circuit strength when compared to a transformer with aluminum windings.



RECOMMENDATION: ▼

Improvements in technology regarding the use of aluminum in transformers have made aluminum-wound transformers the ideal choice for today's applications.



RATIONALE: ▼

OPERATING COST

Cooper Power Systems designs aluminum-wound transformers with windings of a larger cross-sectional area than would be used for a copper wound unit. This larger cross-sectional area translates to a lower current density, and an equivalent operating temperature. By reducing the current density in the windings, a low-loss design can be achieved with aluminum or copper windings.



RELIABILITY

A transformer's life is defined by the life of its insulation system. Because Cooper aluminum-wound and copper-wound units run at equivalent operating temperatures, the insulation systems age at the same rate for each design.



LOWER FIRST COST

Whether low losses are the goal or not, aluminum windings are less expensive than copper windings. The following example shows two equivalent-loss designs, one with aluminum windings and one with copper windings.



Example: 2500 kVA, 3-phase padmount transformer, 13800 Delta - 480Y/277

	Aluminum Windings	Copper Windings
No-Load Losses (CW)	2,607	2,599
Load Losses (WW)	13,261	13,194
Total Losses (TW)	15,868	15,793
Efficiency at 100% Load	99.4%	99.4%
Dimensions (H x W x D)	73 x 71 x 42	73 x 69 x 38
Price	\$17,700	\$20,435

In this example, the losses are roughly equivalent, but the price of the aluminum-wound unit is over \$2700 (13%) less expensive.



THE BOTTOM LINE: ▼

Cooper Power Systems designs its aluminum-wound coils using the same thermal, dielectric and mechanical performance requirements as for its copper-wound coils. In padmount and substation designs, Cooper aluminum-wound units and copper-wound units serve their loads equally well.

